LG Electricity Meters

Single & Poly-Phase

ELECTRICITY METERS

- General
- Construction
- Technical Data
- Main Model
- Adjusting Facilities
- Circuit Diagrams
- Typical performance Characteristic Curves
- Ordering Details

Index

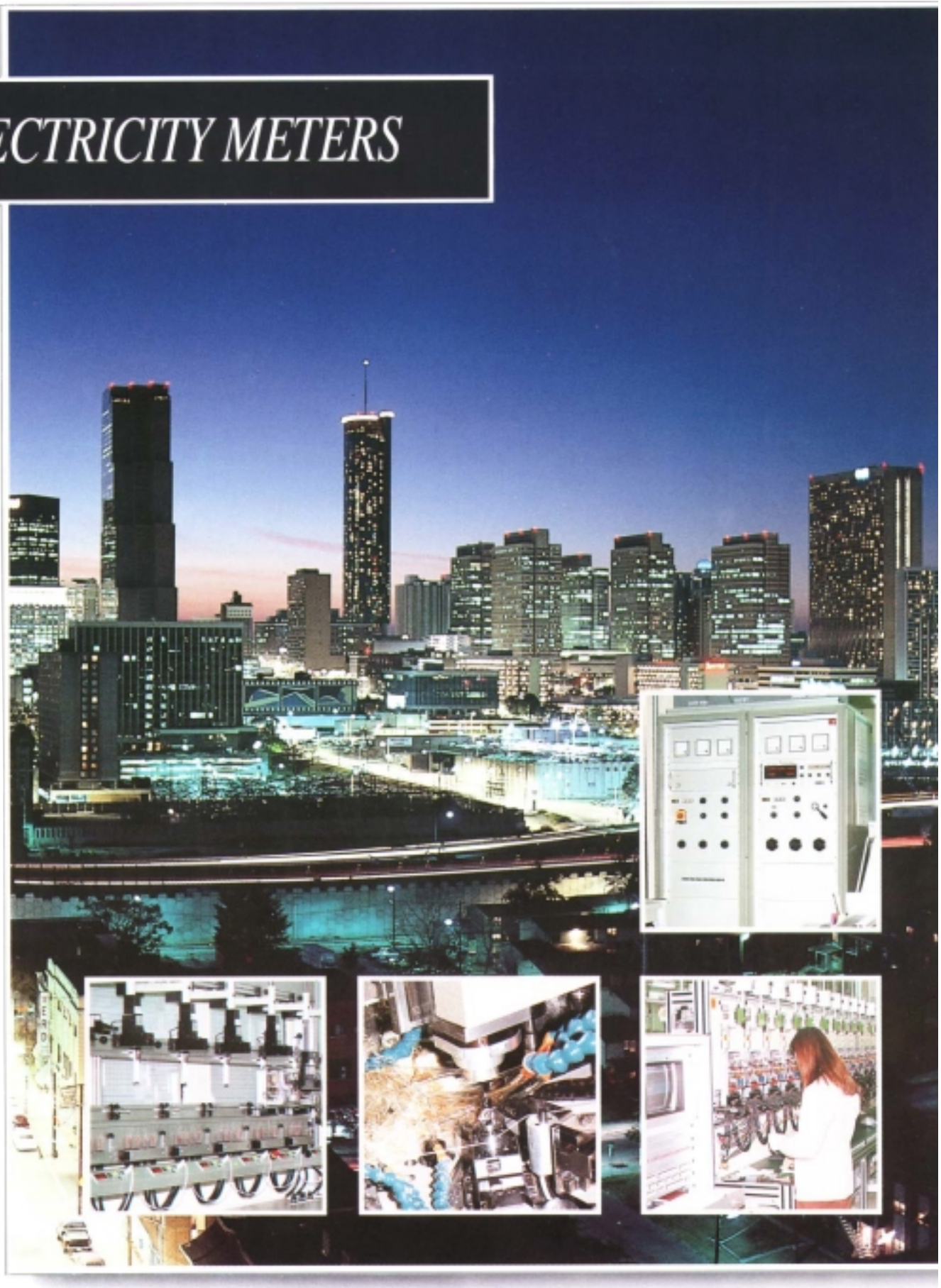
TÜV CERT
ISO 9001

Single & Poly-Phase

ELECTRICITY METERS

LG Industrial Systems Co., Ltd.

ELECTRICITY METERS



Contents Index

Since the first production of electricity meters in Korea in 1962

We have incessantly made researches and developments and came to succeed in developing long-life electricity meter capable of registering up to 600% in 1989.
LG electricity meters of WL and WB series are designed to meet the highest demands with respect to accuracy and reliability. They have a wide measuring range and long service life.
WL and WB series comply with the specifications of

IEC 521 : WL Type
BS 5685 : WB Type

And they can be conformed to meet other standards and your special requirements.
In future, we will make much more effort to supply products to completely meet and satisfy custommer's needs and to become the worlds best manufacturer of electricity meters through research and developments.

Design Features

- **Compact and modern design**
- **Simple to adjust**
- **Low friction and low temperature rise**
- **High accuracy and long-term reliability**
- **Low operation noise level**
- **Contact proof terminals**
- **High mechanical stability**
- **Maintenance-free components**
- **Diverse options such as remote meter reading system**

Contents Index

CONSTRUCTION

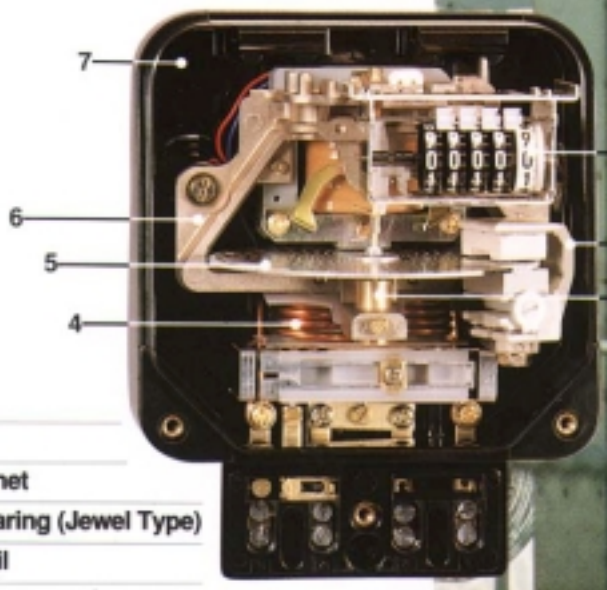
Case

The case with its integral terminal block is moulded in a high quality black phenolic material. This is of generous section with internal ribbing resulting in a robust and mechanically strong unit.
The transparent meter cover is made of moulded polycarbonate providing a clear front view.
The carrying handle fitted to the top of base may be provided on request. The cover hooked into the top of the base and fastened by two sealable screws at the bottom. The terminal cover of moulded plastic is fixed to the terminal block with a sealable screw. The extended terminal cover is also available.

Measuring system support

The measuring system support consists of an aluminum alloy die-casting. It is fixed to the base by screws. On this frame are mounted the current and voltage elements together with the break magnet assembly, bearing system and register.
When required pawl can be fitted to the meter frame to act against the rotor cam and form an effective reverse running stop. The voltage and current elements are fixed with screws on the frame ensuring a precise and stable main gap with minimum stress applied to the lamination stacks.
A pair of anisotropic brake magnets, one situated above to a die-casting which is screwed to the frame.

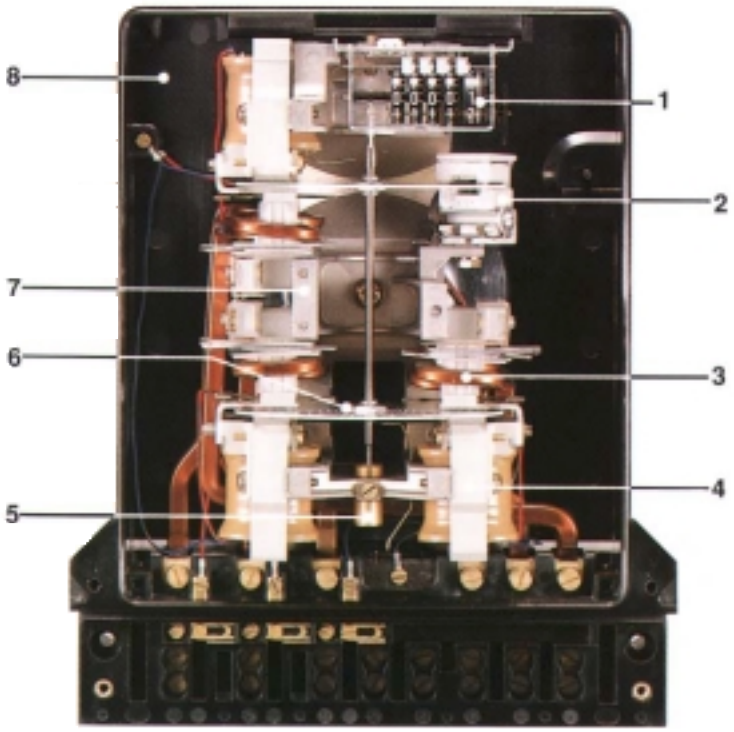
Single phase 2-wire Meter (WL 13S)



1. Register
2. Brake Magnet
3. Bottom Bearing (Jewel Type)
4. Current Coil
5. Rotor
6. Meter Frame
7. Meter Base

The Driving Elements

The voltage and current electromagnet cores are produced from precision cold steel formed into laminations of high accuracy. The mounting of these cores on the frame is also designed to minimize strains and thus ensure long term stability. The limb of the current electromagnet has a number of iron turns which can be cut open for the purpose of coarsely adjusting the inductive load. The yoke of the current electromagnet carries a copper winding whose circuit is completed through a loop of copper sheet. The copper sheet reduces the temperature-dependence of the meter.
The voltage coil is wound wire of high conductivity enamelled copper covered with a coating of polyurethane insulation of very high quality.
The coil is wound on a moulded polypropylene former and is protected by a heat-shrunk sealing sleeve. The use of these modern insulation materials provides exceptional protection against short circuited turns and ensures a high quality consistent product with the ability to withstand impulse voltages. A slide contact in the current coil former varies the effective length of this phase compensating loop, thus providing fine adjustment of the inductive load.
The current coil, which consists of a specially shaped copper conductor, is insulated by coating with epoxy resin(or enamel) and mounted on a temperature resistant plastic former giving the meter double insulation. The laminated core is provided with overload compensation.
A fine adjustment lever for low loads is fixed to the meter element support and has no mechanical reaction on the voltage system. It is accessible from the front and has a wide adjustment range.



Three phase 4-wire Meter (WL 43R)

1. Register
2. Brake Magnet
3. Current Coil
4. Voltage Element Ass'y
5. Bottom Bearing (Jewel Type)
6. Rotor(Two Disc)
7. Meter Frame
8. Meter Base

Contents Index

CONSTRUCTION

Top Bearing

The top bearing of the rotor consist of a 0.4mm diameter stainless steel guide needle running in a graphite ring.
The top bearing requires no oiling and has stable characteristics over a long period.

Bottom Bearing

There are two types of bottom bearings.
The double jewel bottom bearing is so designed that constant friction is ensured for a long period. A mirror-finished steel ball rotates between two sapphire cups which are secured in plastic shrouds. The whole plastic assembly is spring-supported and can be easily replaced by removing the cap.
The magnet floating type bearing consist of a pair of concentric disc magnets, made of phenolic bonded Alico grain, in repulsion. The pole faces of the discs are protected against accidental localised demagnetization by a thin integrally bonded barium ferrite covering.
The magnets are identically magnetized with two annular poles and when rotor assembly to "float" with 1mm nominal air gap between the magnetic discs.

Register

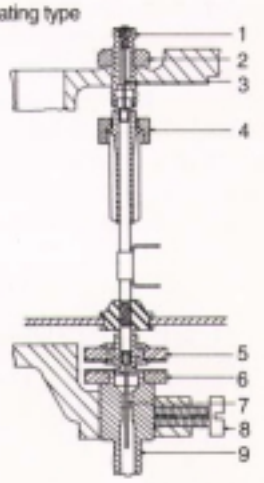
The register is normally of the five digit type.
Six digits may be provided on special request.
The quick changeover type register, operated positively by on out of balance member, may be provided on request. The 0.6mm diameter shafts rotate in plastic bearing while the stationary 1.3mm shafts are resiliently supported by the frame. The register is oil-free and maintains constant friction even after a long period of operation. The ratio wheels can be easily removed from the shafts should the register have to be adapted to other voltage and current ratings.

Brake Magnet

The brake magnet comprises two high energy, high coercive magnetic chips secured to an aluminum die-cast holder. Errors due to temperature variations are compensated by a shunt of highly sensitive thermal alloy.
Coarse adjustment is achieved by rotation the whole magnet assembly about the fixing screw centre. Fine adjustment is affected by rotating a barium ferrite disc magnet which has finely stepped notches and is arranged laterally at the lower magnet.

Rotor & Bearing system

• Magnet floating type



1. Top brass housing
2. Locking nut
3. Stainless steel pin
4. Damping weight
5. Top suspension magnet
6. Bottomsuspension magnet
7. Stainless steel pin
8. Locking screw
9. Bottom brass housing

The rotor is constrained against lateral movement by means of carbon bearings located at each end of the spindle running on polished stainless steel pins. The upper moulded journal housing incorporates the rotor worm and carries a damping weight which reduces vibration. (provided on request) Both housings are pushed onto the rotor spindle and may be replaced if necessary without recourse to tools. The spindle also carries an adjustable anti-creep vane to inhabit continuous rotation of the rotor disc on voltage only.
The disc is made of pure aluminum, die-cast onto an alloy spindle and is printed with 200 divisions. The periphery has 400 serrations for stroboscopic methods of testing and both face and edge carry a wide mark.

TECHNICAL DATA

Type		Single-phase 2-wire							
Load capacity(%Iн)		300		400				500	600
Basic current (A)		10	40	5	10	20	30	10	10
Max. current(A)		30	120	20	40	80	120	50	60
Power consumption in current circuit	(W)	0.45	0.7	0.27	0.27	0.35	0.28	0.21	0.14
	(VA)	0.72	1.2	0.42	0.42	0.6	0.43	0.32	0.24
Type of standard		WL,WB	WL	WL,WB	WL,WB	WB	WL	WB	WB
Power consumption in voltage circuit	(W)	0.8		1.1				1.2	1.4
	(VA)	2.5		3.7				4.0	4.5
Weight of meter (kg)		1.1	1.5	1.53	1.53	1.54	1.54	1.54	1.54

Type		Three-phase 4-wire				
Load capacity (%Iн)		300		400		Transformer-operated meters
Basic current (A)		10	40	10	30	2.5
Max. current (A)		30	120	40	120	5
Power consumption in current circuit	(W)	0.13	0.34	0.16	0.26	0.64
	(VA)	0.18	0.42	0.24	0.3	0.9
Type of standard		WL	WL	WL	WL	WL
Power consumption in voltage circuit	(W)	0.85		1.0		1.0
	(VA)	3.1		3.6		3.6
Weight of meter (kg)		3.0	4.0	3.2	4.0	2.9

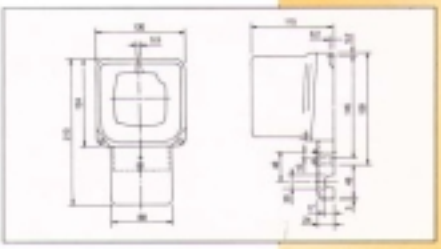
Rated voltage (V)	220 / 240
Rated frequency (Hz)	50 / 60
Class	2.0
Starting current	≤ 0.5% Is at unity p. f
Creeping	No creeping between 80% and 110% rated voltage
Influence due to temperature	In the range 0 ° C to 40° C and with loads between of the rated current and maximum rated current, for each 10° C of temperature increase (decrease)
at unity power factor	+0.3% (-0.3%)
at 0.5 power factor lagging	-0.5% (+0.5%)

MAIN MODEL

single-phase 2-wire meter

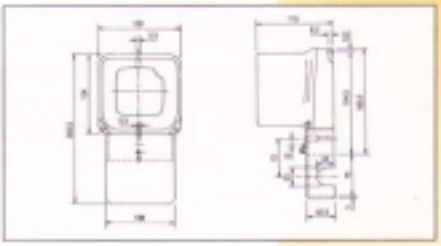
WL 13S

Circuit System	Single-phase 2-wire
Rated Current (A)	10(30)
Rated Voltage (V)	240
Load Capacity (%In)	300



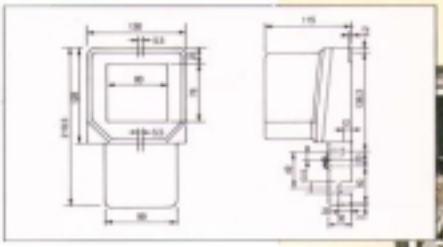
WL 13S

Circuit System	Single-phase 2-wire
Rated Current (A)	40(120)
Rated Voltage (V)	240
Load Capacity (%In)	300



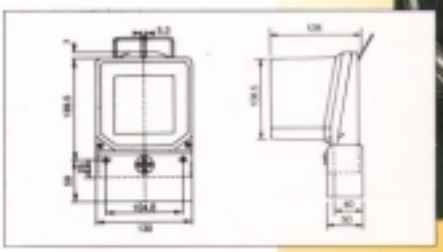
WL 14S

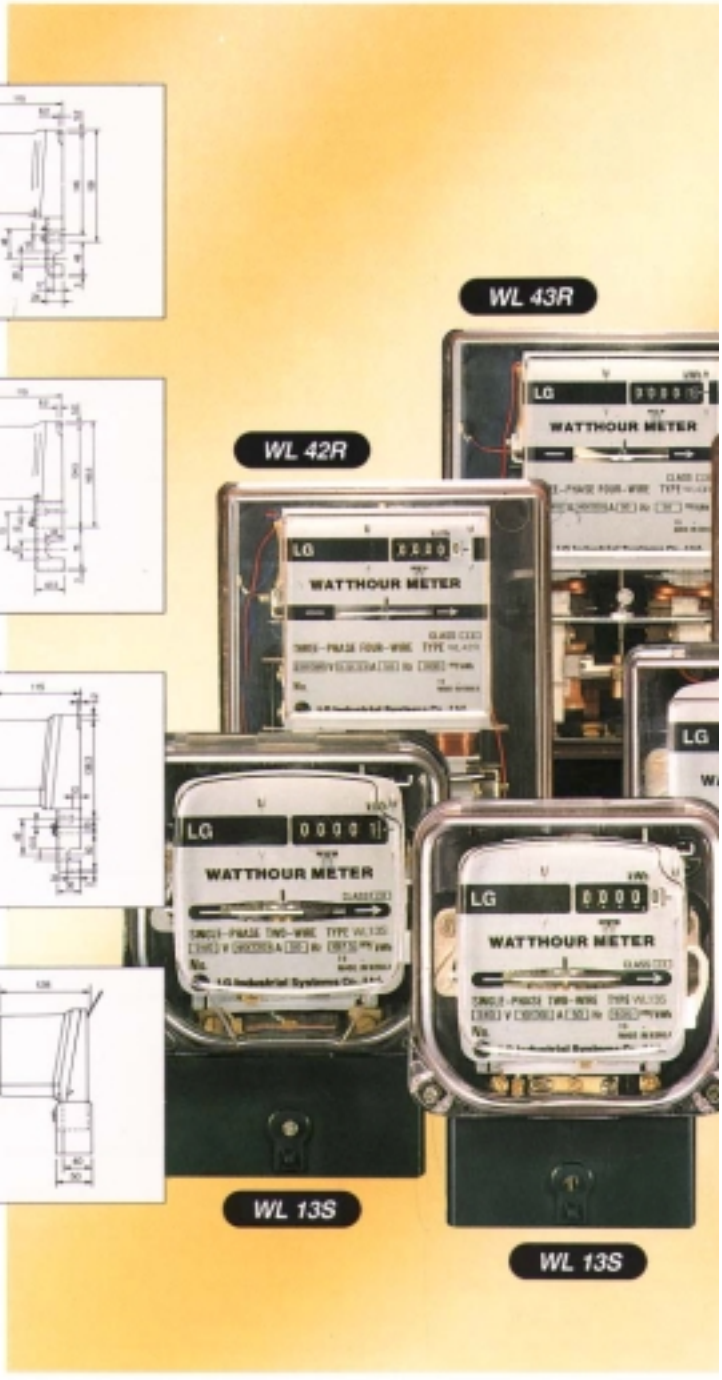
Circuit System	Single-phase 2-wire
Rated Current (A)	10(40)
Rated Voltage (V)	220
Load Capacity (%In)	400



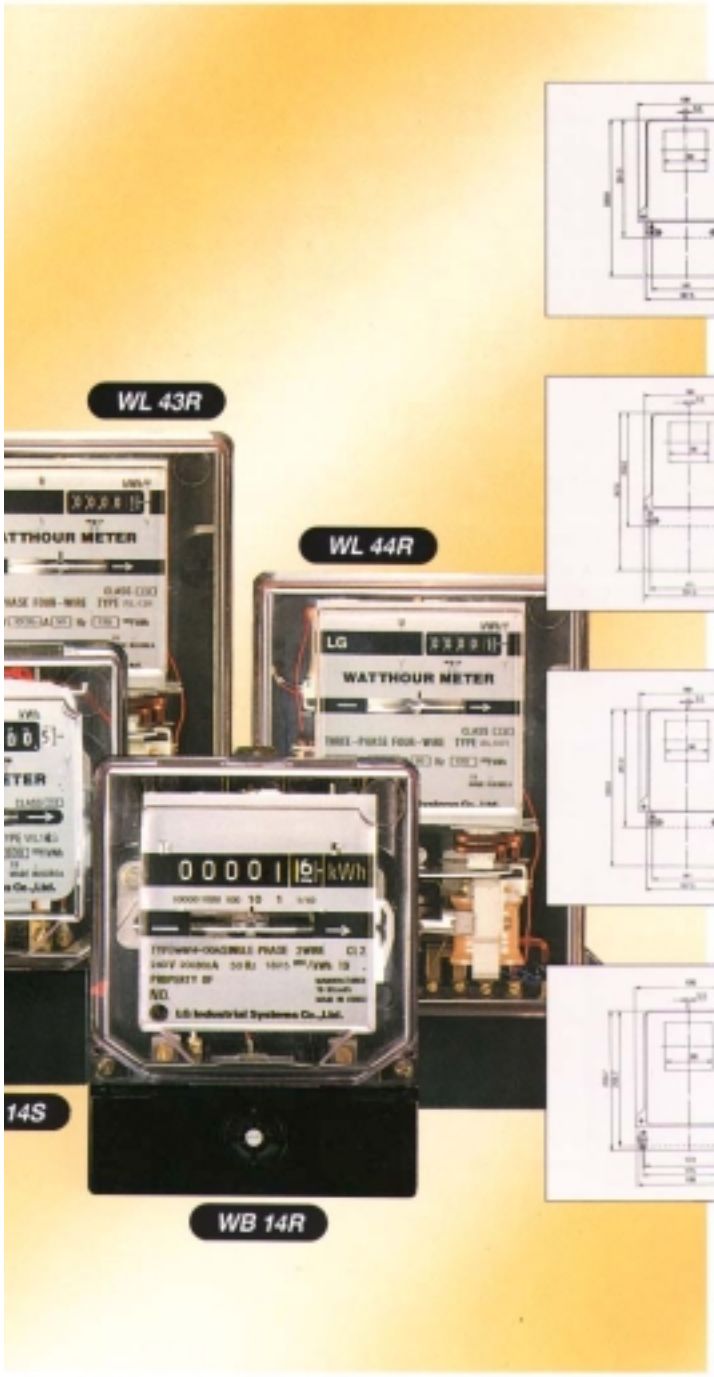
WB 14R

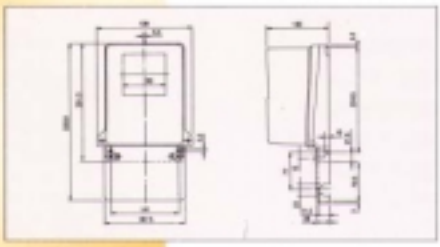
Circuit System	Single-phase 2-wire
Rated Current (A)	20(80)
Rated Voltage (V)	240
Load Capacity (%In)	400





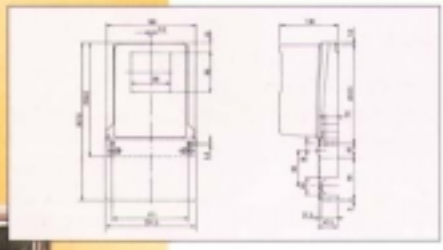
Three-phase 4-wire meter





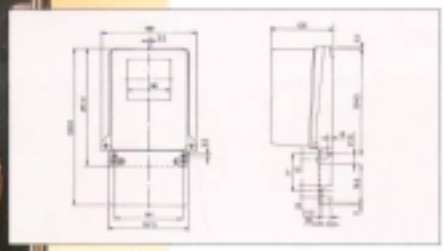
Circuit System	Three-phase 4-wire
Rated Current (A)	10(30)
Rated Voltage (V)	240/415
Load Capacity (%In)	300

WL 43R



Circuit System	Three-phase 4-wire
Rated Current (A)	40(120)
Rated Voltage (V)	240/415
Load Capacity (%In)	300

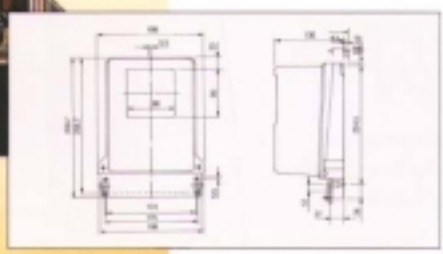
WL 43R



Circuit System	Three-phase 4-wire
Rated Current (A)	10(40)
Rated Voltage (V)	240/415
Load Capacity (%In)	400

WL 44R

Transformer connected meter



Circuit System	Three-phase 4-wire
Rated Current (A)	2.5(5)
Rated Voltage (V)	220/380
Load Capacity (%In)	200

WL 42R

ADJUSTING FACILITIES

1. Starting torque adjustment

A pliable U-shaped metal vane sets up a braking effect with the aid of the stray field from the moving elements. The required starting torque is set by changing the distance between the two pro-truding limbs on this vane. The braking effect does not depend on the vertical play of the rotor, provided that the tongue attached to the moving elements is between the protruding ends of the brake vane.

2. Inductive load adjustment

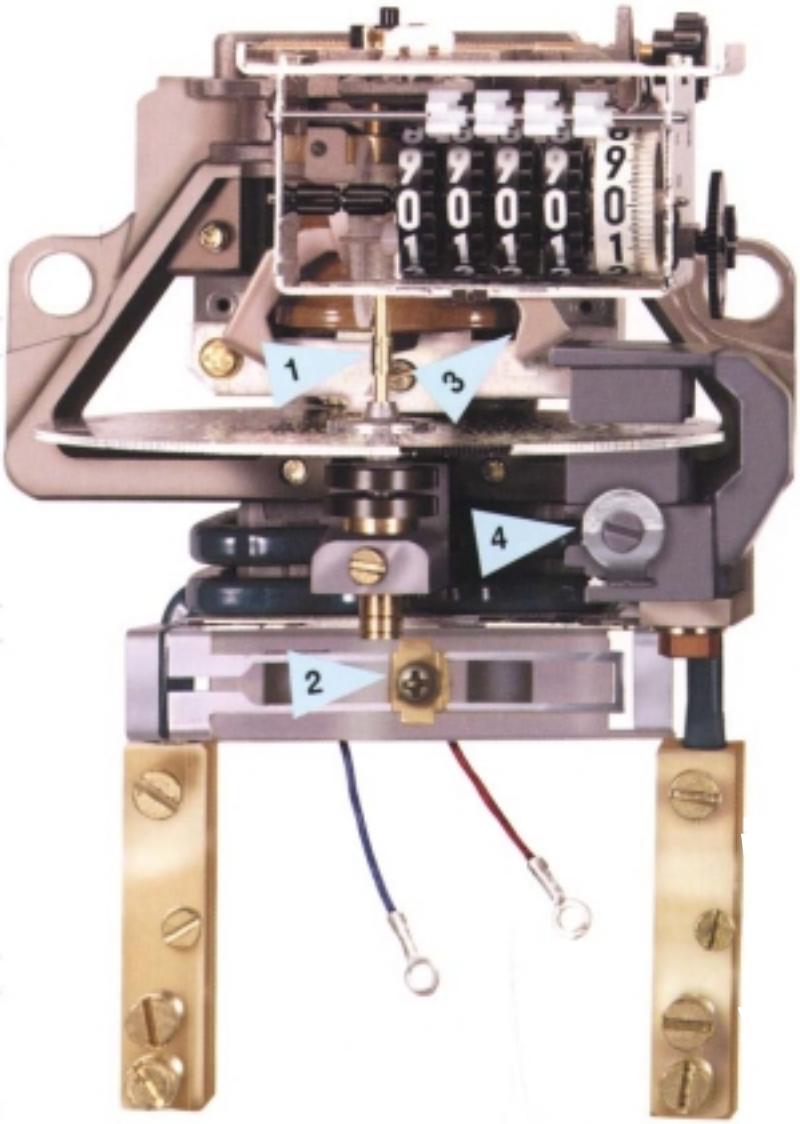
Coarse adjustment is effected by cutting open the phase compensating turns. Fine adjustment is effected by relocating the sliding contact screw, thus varying the resistance of the load winding on the current electromagnet.

3. Low load fine adjustment

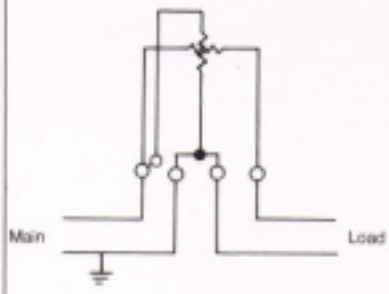
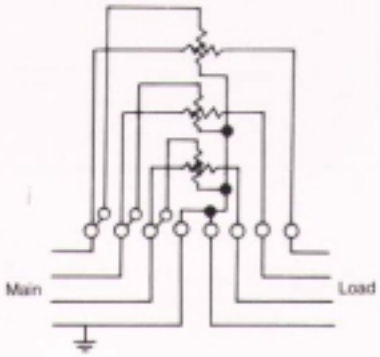
The lever mounted on the meter element support frame displaces the voltage flux, thus regulating the moving and restraining forces.
Creeping is thus eliminated and the low-load point firmly set.

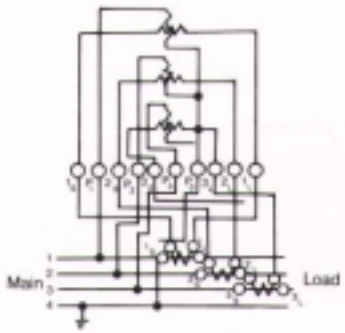
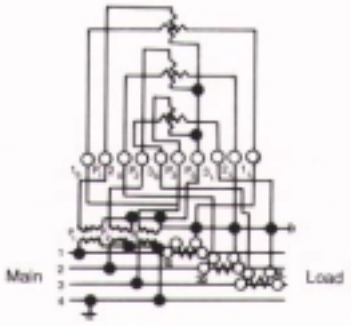
4. Rated speed

Coarse adjustment is obtained by the magnet being turned parallel to the rotor disc, thereby changing the rated speed. Fine adjustment is obtained by rotating the disc-shaped magnetic shunt.



CIRCUIT DIAGRAMS

Phase & wire / wiring connection	Single-phase 2 wire	Three-phase 4 wire
Direct connection meter		

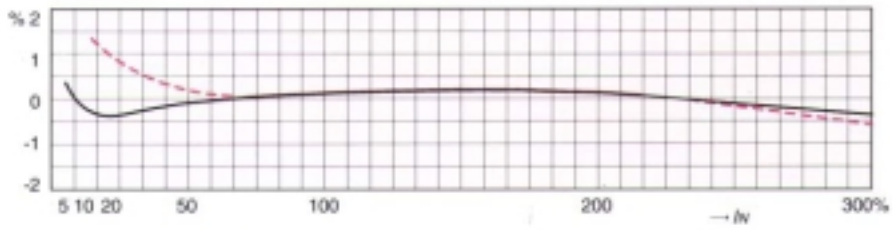
Phase & wire / wiring connection	Three-phase 4 wire	
	CT connection	CT and PT connection
CT or PT operated meter		

TYPICAL PERFORMANCE CHARACTERISTIC CURVES

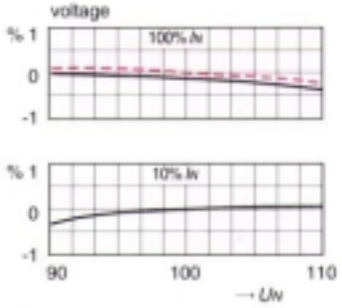
single-phase 2wire

cos φ = 0.5
cos φ = 1.0

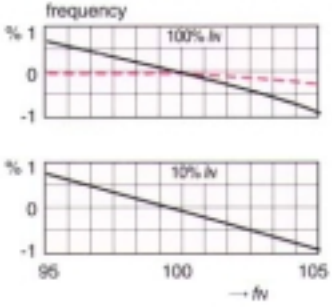
Load curve



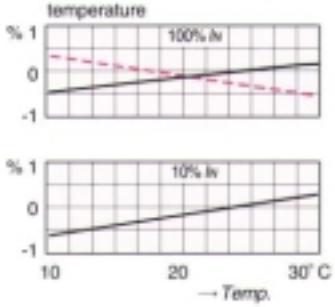
Effect on load curve by varying the voltage



Effect on load curve by varying the frequency

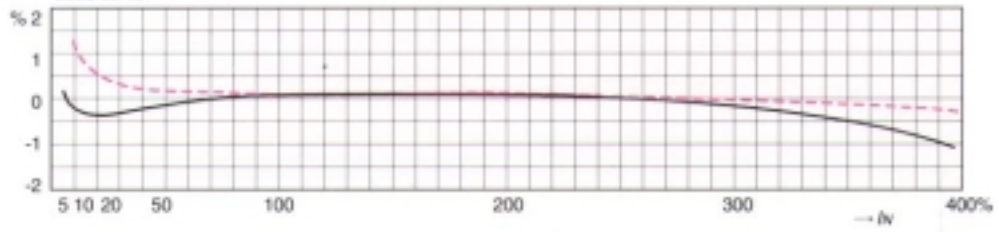


Effect on load curve by varying the temperature

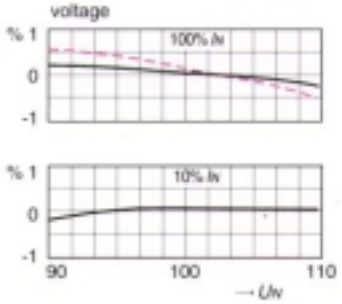


cos φ = 0.5
cos φ = 1.0

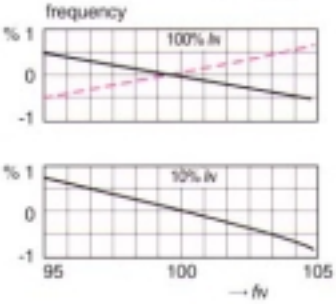
Load curve



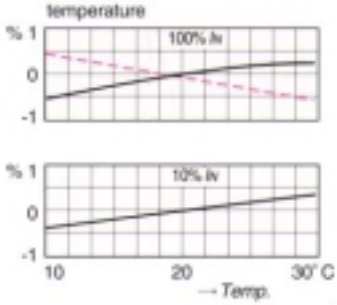
Effect on load curve by varying the voltage



Effect on load curve by varying the frequency



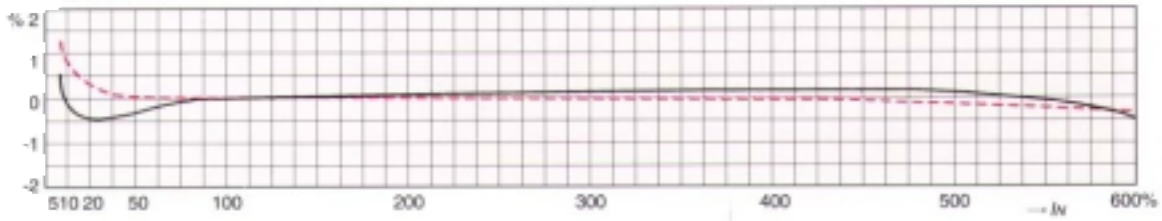
Effect on load curve by varying the temperature



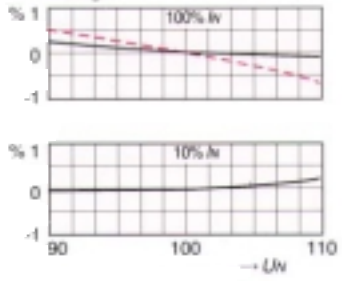
cos φ = 0.5

cos φ = 1.0

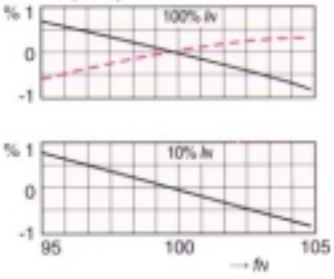
Load curve



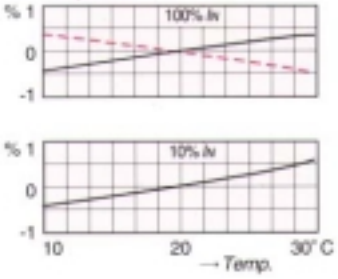
Effect on load curve by varying the voltage



Effect on load curve by varying the frequency



Effect on load curve by varying the temperature



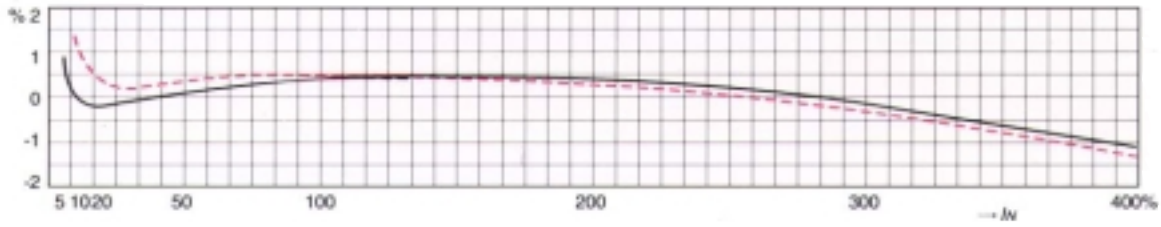
Contents Index

TYPICAL PERFORMANCE CHARACTERISTIC CURVES

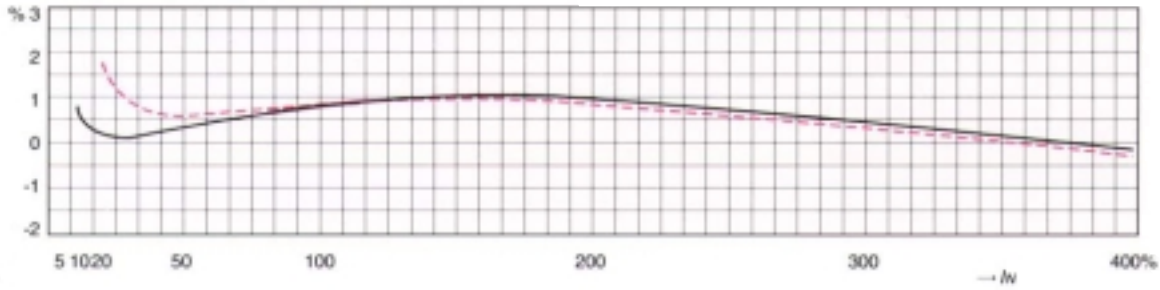
three-phase 4wire

cos φ = 0.5
cos φ = 1.0

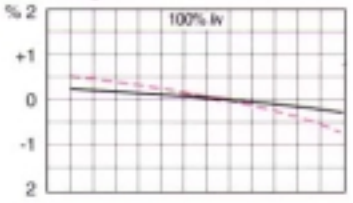
Balanced load

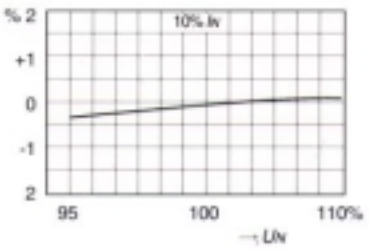


Unbalanced load between two phases

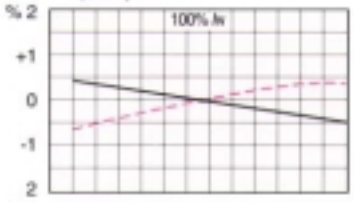


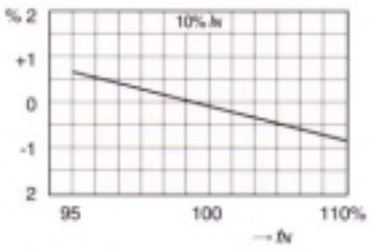
Additional error for change in voltage



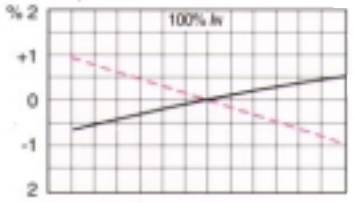


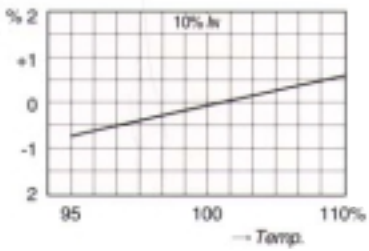
Additional error for change in frequency



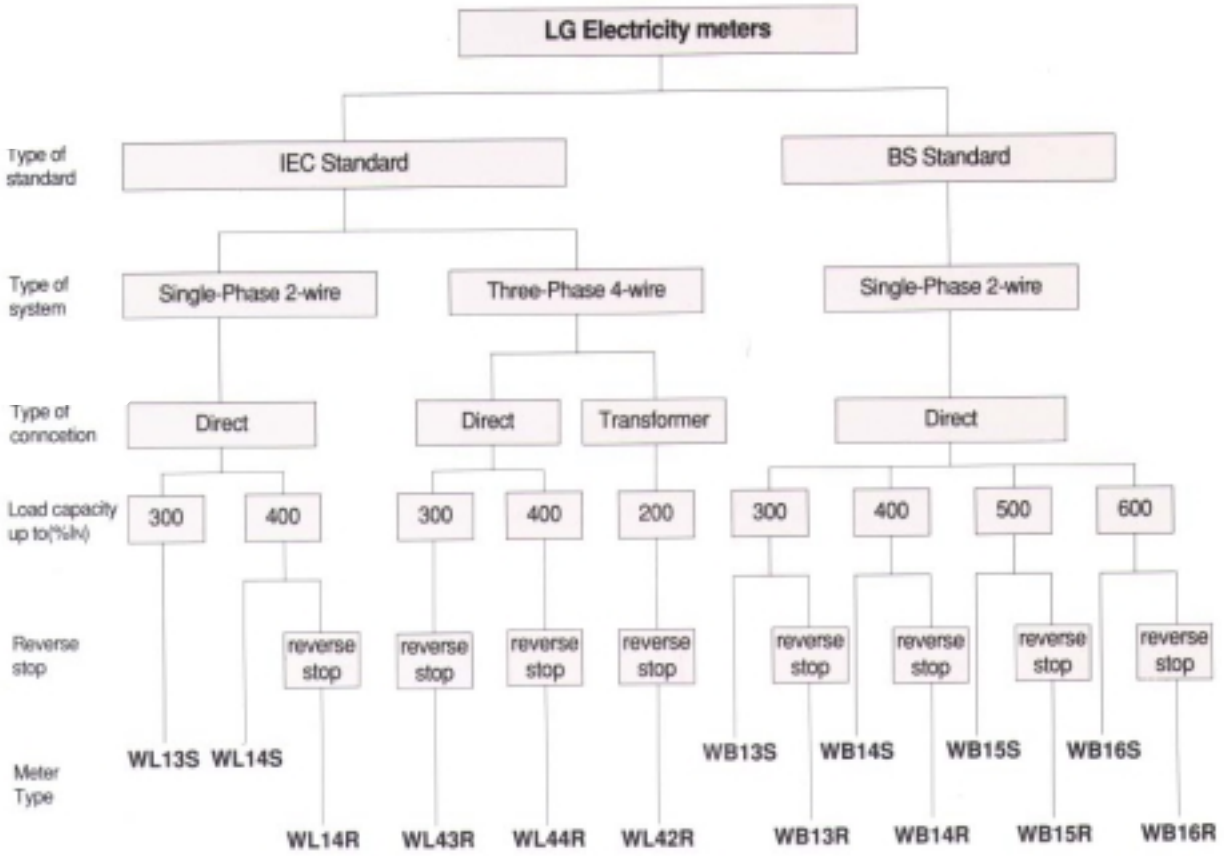


Additional error for change in temperature





ORDERING DETAILS



When ordering or requesting please inform us the followings

ORDER SPECIFICATION	EXAMPLE
1. Meter type	WL14S
2. Basic current(Max. current)	10(40)A
3. Rated voltage and frequency	220V, 50Hz
4. Connection	Direct connection (or Current Transformer-operated)
5. Lower bearing type	Magnetic bearing(or Jewel bearing)
6. Type of impulsing device	Single channel lead S/W output
7. Type of terminal cover	Extended terminal cover

Contents Index

LG constantly endeavors to improve our products, so that information in this catalog is subject to change without notice.

LG Industrial Systems Co., Ltd.

■ **HEAD OFFICE**
LG Mullae Building 10, Mullae-dong, 6-ga, Youngdungpo-gu,
Seoul 150-096, Korea
Tel: (82)02-2006-3203~3215 Fax: (82)02-2006-3910

■ **E-mail address: sungokp@ lgis.lg.co.kr**

■ **http://www.lgis.lg.co.kr**

META-MEC(E)99.9901/Dec. 1999 Printed in Korea H/M